SCIENCE.

FRIDAY, JANUARY 8, 1886.

COMMENT AND CRITICISM.

THAT ADDICTION TO THE USE of opium is very much more common than is generally supposed, and that it is on the increase, is shown by a recently published brochure of Dr. Meylert ('Notes on the opium habit,' New York, *Putnam*); and that there is a wide-spread interest in the subject, not confined to the medical profession, is evinced by the fact that this pamphlet has now reached its fourth edition, and that other treatises more pretentious have recently been published, and attained a circulation more or less extensive. Dr. Meylert attributes many deaths of patients in hospitals and asylums, and of soldiers on the march, to the sudden deprivation of opium to which they have been accustomed; and on this, and the suffering which habitués experience in their efforts to discontinue at once the use of the drug, he makes his plea for the abandonment of the 'rack-and-thumbscrew' treatment, and the adoption in its place of more humane methods. The basis of the author's method of cure is, that the opium habit is not an indulgence to be humored, nor a vice to be punished, but a disease which must be treated as other diseases are, by appropriate remedies. Atropia, which has become a favorite remedy with those who advertise rapid cure, does not stand the tests of experience. Coca and Avena sativa are not of any special value. The bromides of potassium and sodium, quinine, Cannabis indica, strychnia, hydrocyanic acid, chloroform, hyoscyamus, and phosphorus are the remedies in which the greatest reliance is placed; the one or the other, or combinations of them, being prescribed according to the special indication in each case. The moral treatment is not neglected in Dr. Meylert's plan, and the necessity for implicit trust and reliance in the physician by the patient is not overlooked. After all, 'the best test of success is success;' and whether the methods here advocated are adapted to bring about the desired results can only be ascertained by careful and patient study of a long series of cases. We shall watch with interest for these results, which should as soon as obtained be published, whether they speak for or against the methods advocated.

IN A PAPER recently read before the American institute of mining engineers, Mr. A. E. Lehman describes some of the methods of construction and the uses of topographic models or relief-maps. Their use for educational and economic as well as scientific purposes is rapidly increasing, as the belief in the importance of representing quantitatively the vertical element of topography gains strength. The value of the relief-map for all purposes, and especially for educational uses, is seriously impaired by exaggeration of the vertical scale. This should be avoided whenever possible, and in other cases should be reduced to a minimum. While Mr. Lehman advises exaggeration, the appearance of his model of the Cumberland valley, wherein the exaggeration is four and five-sevenths, is a strong argument against it. An even stronger argument is furnished in the form of an ambitious relief-map of the United States, by Mr. F. H. King, and mentioned by Mr. Lehman. In this model the vertical scale is exaggerated over the horizontal sixty-eight and a half times; and the effect, especially in an abrupt mountain region, can be easily imagined. This map has other faults, which will probably limit its sphere of usefulness. Another notable example of the distortion produced by the exaggeration of the vertical scale is the well-known model of the Atlantic and Gulf coasts, made by the U. S. coast and geodetic survey. That effective models can be made, even of extensive areas, without exaggeration of the vertical scale, is abundantly shown by the relief-maps in the national museum.

THE RECENT MEETING of the society of naturalists in Boston was a successful one, as such meetings go. The attendance was fair, considering the eccentric position of the place of meeting, and the papers were in nearly every case of distinct value and interest. But in spite of full attendance at the sessions, and at the dinner that closed the first day of meeting, there was not sufficient acquaintance among the members; and during the sessions the silence of formality settled down

so heavily, that nearly all conversational questioning of the speakers was extinguished. The more experienced in such occasions maintained a certain amount of discussion by well-determined efforts to speak as often as possible; but the greater number felt the difference between speaking and talking, and said nothing. Inasmuch as it is generally agreed that the increase of personal acquaintance, and the pleasure of personal conversation, are the best results brought about by such meetings, we believe it will be worth the while of the naturalists' executive committee to make definite preparation for the accomplishment of these ends at Philadelphia a year hence.

We have before us the tenth annual report of President Gilman to the trustees of the Johns Hopkins university. It is a brief but eminently perspicuous and comprehensive document. It is with no little satisfaction that the president marshals in the appendices of his report the swelling lists of professors, associates, lecturers, instructors, fellows, and graduates; and the record of the work done during the year, as given in appendix D, is worthy of the strong force of workers. Perhaps the most notable event in the year was the delivery of a course of twenty lectures by Sir William Thomson of the University of Glasgow. No man living has made to physical science such valuable contributions as Sir William; and his visit and lectures, therefore, were most welcome. The only part of the president's report which seems to call for particular comment is what he terms 'the group system of undergraduate studies.' The discussion refers particularly to the department of undergraduates in the university. With respect to them the president speaks as follows: "In place of a single curriculum, and instead of no curriculum, several parallel curricula have been arranged, which are assumed to be equally honorable, liberal, and difficult, and which therefore lead to the same degree of bachelor of arts. They all include the study of (*a*) language and literature, (*b*) mathematics and other exact sciences, (*c*) historical and moral science; but the proportions of the different studies vary. Seven schedules are announced upon the register, one of which must be chosen by every undergraduate who wishes to proceed to the bachelor's degree. Certain studies are common to all these courses, that is to say, must be taken up by every undergraduate." The seven courses of study are enumerated as the classical, the mathematical-physical, the chemical-biological, the physical-chemical, the Latin-mathematical, the historical-political, and modern languages. No one can question, that, assuming a good entrance preparation, any one of these seven courses may be made the medium of a solid liberal education. This arrangement presents a practical solution of the question of elective studies for college undergraduates. It presents to the young student several lines of study, any one of which may be elected and pursued to the bachelor's degree. It reserves for the university stage of studentship the more free selection of studies which may safely be left to the maturer judgment of those who have reached it.

In its last annual report, the Philadelphia Academy of natural sciences gives a statement of its growth and needs, that, it is hoped, will receive the attention it merits. There is urgent need of more extensive accommodations for the rapidly growing collections, many of which, such as the large series of rocks and fossils of the Pennsylvania geological survey, yet remain unpacked or inaccessible. The present resources of the society are insufficient to meet the rapidly growing demands of modern science. It is earnestly hoped that the contemplated extension of the present building may be realized, that this, one of the oldest, as well as most honored of our scientific societies, may keep pace with the activity elsewhere displayed in American science.

In connection with the recent attempts to prevent the further weathering and decay of the obelisk, it will not be without interest to state that Dr. Stelzner of Freiburg early prophesied the injurious effects of our climatic agencies. In his report upon the microscopical characters of the rock, undertaken at the request of Dr. Frazer of Philadelphia, he wrote an earnest plea for the preservation of the obelisk, predicting, that, were no preventive means adopted, it would crumble within a few years. In support of this prediction, he cited the experience with the St. Petersburg obelisk and the press comments on the one in London. This warning, however, owing to the objections of Lieutenant-Commander Gorringe, did not appear in the published report.

ON THE OCCASION of introducing his course of lectures at the Sorbonne, M. Ribot reviewed the history and aims of psychology. England, Germany, France, Italy, and the United States, by instituting collegiate and university chairs in this department, and by publishing journals, books, and researches devoted to it, all show an increasing activity in this direction. According to M. Ribot, a psychologist is a naturalist: his subject is a part of biology, and is to be treated by precisely as scientific and as exact methods. It is not a metaphysics in any sense, and is no more called upon to speculate on the nature of the soul than physics to lead us into the essence of matter. It is not a psychology with any religious, moral, or any other tendency, but is a science founded on objective facts, true for all men alike. There are no systems of psychology: there is one psychology, as there is one chemistry.

This psychology, however, was possible only after physiology had been brought to a high state of culture. The physiology of the nervous system, and especially of the brain, is the necessary basis for a scientific study of mind. Psychology also borrows from pathology, because nature prepares experiments which no man would venture to perform. It owes a debt to anthropology, to the social sciences, to culture and history. It takes a broad point of view, having already adopted the methods suggested by comparative biology and the evolutionary movement. The field is already so broad that specialists are necessary, although the whole development is not fifty years old. M. Ribot has given expression to a conviction which is now everywhere current, and which seems destined to play an important *rôle* in the science of the future, in this country as well as elsewhere.

GENERAL ABBOTT'S REPORT ON THE FLOOD ROCK EXPLOSION.

THE advance sheets of General Abbott's report to the chief of engineers on the 'Earth-wave at the destruction of Flood Rock' have been kindly sent to *Science*, and form the basis of the following account: —

As to the destruction of the rock itself, 48,537 pounds of dynamite No. 1, and 240,399 pounds of rackarock, equivalent in all to about one hundred and fifty tons of dynamite, were stowed away in the galleries within the rock, and simply a touch on a telegraphic key by little Miss Mary Newton set the whole mass into instant explosion. Photographs taken by three cameras, all exposed before the mass of water lifted by the blast had reached its greatest height, indicate that all parts of the mine were fired at practically the same instant; and, by means of electric recording apparatus, this instant was recorded to be $11^h\ 13^m\ 50^s.2$, eastern standard time. It should have been at eleven o'clock precisely, and readers of *Science* are aware already that observations of the earth-wave were lost at several stations by this delay of nearly fourteen minutes. Concerning this, General Abbott says that if these volunteer observers who have criticised the delay in an unfriendly spirit had known how seriously it endangered the success of the official work intrusted to him, they would doubtless have taken a more charitable view of the matter. It was without question unavoidable, and is much regretted; but, if a similar opportunity ever occur again to make earth-wave experiments on so large a scale, it will be well, on the one hand, for those in charge to give official notice of possible delay when the appointed time is announced, and, on the other, for the detached observers to watch their instruments steadily until a message is sent them that the shock is over.

One of the photographs caught the first sight of the earthquake produced by the explosion. The cameras were eleven hundred and thirty feet from the rock, and the first exposure was made about two-tenths of a second after closing the mine circuit. The view shows that the camera was then still steady; the disturbance had not quite reached it, but was only about one hundred and seventy-five feet away. The second picture was taken four-tenths of a second later, and by this time the more violent portion of the wave had passed. To measure the velocity of progression over greater distances, members of the engineer corps and other officers of the army were stationed at four points on Long Island and at West Point; and, besides the successful observations from these places, General Abbott gives records from Goat Island (the torpedo station at Newport, R. I.), Hamilton and Harvard colleges; and to these we may add Princeton. Accounts of the observations made at the latter two points have already been given in *Science*. At all these stations the observers watched a surface of mercury in which the reflection of some small, well-defined object could be seen. The arrival of the disturbance shook the mercury, and caused the reflected images to disappear. The reports generally agree that the maximum of disturbance was very quickly or immediately reached, and none of them express serious doubt of the accuracy of their determi-

nations. The following table exhibits the results:—

Station.	Distance in miles.	Interval of transmission.	Velocity in miles per second.
Willet's Point, L.I.....	8.33	8.5	0.98
Pearsalls, "	16.78	6 6	2.54
Bay Shore, "	36.65	13.0	2 82
Patchogue, "	48.32	15.4	3.15
Goat Island, R.I.....	144.80	58.8	2.46
Harvard obs'y, Mass..	182.68	219.8	0.83
West Point, N.Y.....	42.34	13.6	3 11
		10.9	3.88
		10.9	3.88
Hamilton coll., N.Y....	174 37	45.0	3 88
		45.3	3.86
Princeton, N. J.....	48+	51	0.94

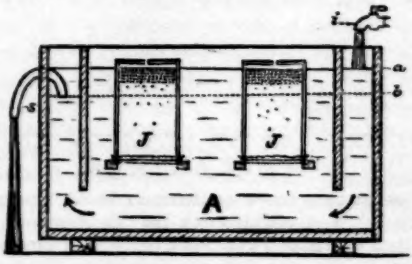
These wave velocities are any thing but accordant, and no satisfactory reason can be given for their variation; but they all agree in showing velocities that are higher than those deduced from observations on natural earthquakes; and from this General Abbott feels confirmed, in his deductions from the explosions of certain torpedoes and at Hallett's Point in 1876, that the more violent the initial shock, the higher is the velocity of transmission. At Flood Rock the charge was about six times as great as at Hallett's Point, and the velocity was from two to three times as great, over essentially the same route. Beyond this, the generalizations are not satisfactory. It is true that the velocities through Long Island, which is largely built of unconsolidated drift, are, on the whole, less than the accordant series up the Hudson valley, through rock; and the Goat Island and Harvard velocities, which must have been almost entirely through rock, seem to show a falling-off in the transmission as the wave weakened over increasing distance. But Hamilton is almost as far as Harvard, and yet its velocity is as great as at West Point; and Princeton must have felt a rock-wave at a moderate distance, and still its velocity had about the rate of that at Willet's Point and Harvard, which are very dissimilarly situated. It certainly cannot be thought that the initial velocity was slower than that at any later moment, except in so far as the nature of material traversed would affect it: therefore the apparent increase along Long Island should be looked for in the less percentage of distance traversed through the drift in reaching the further stations. But beyond this suggestion, hypothesis wanders too freely; and, unless the stations yet to be heard from solve the question, the explosion at Flood Rock has hardly taught us more than that earth-waves are very complicated, and that there is yet much to learn about them.

SUCCESS IN HATCHING THE EGGS OF THE COD.

For four seasons experiments have been carried on for the purpose of discovering a practical method of hatching out the eggs of the cod, — one of the most fertile and valuable of the food-fishes found off our coast. During the period mentioned no less than forty forms of apparatus have been devised and operated, with varying success, by different persons connected with the work of the U. S. fish commission. Up to the present time no device has fulfilled the required conditions, even approximately, with such success as the apparatus just devised by H. C. Chester, superintendent of the Wood's Holl station, of the commission.

This apparatus is essentially automatic, and needs so little attention that one man will by its aid readily care for a hundred million eggs. It consists of a trough seven feet six inches in length, two feet in width, and two feet four inches in depth. At about one foot from either end, vertical wooden partitions, extending to within four inches of the bottom of the trough, are secured. This leaves a space about five feet six inches in length between the partitions. In this space six or eight large glass jars are supported upon a frame, with their tops downward. Those used for the purpose at Wood's Holl are ordinary cylindrical, four-gallon specimen jars, with a half-inch hole drilled in the centre of the bottom. The stoppers of the jars are removed, and a single thickness of coarse cheese-cloth is secured over the mouth with strong twine. The jar is then inverted, and lowered into the trough, so that its bottom is about even with the top of the trough. Strips nailed across the top of the trough serve to keep the jars upright.

The accompanying figure, showing the device in



longitudinal vertical section, modified and designed on a somewhat smaller scale than the device now in use, and accommodating only four jars (two in a row), will enable the reader to get a clear conception of the way in which the apparatus is used. The trough *A* is filled with unfiltered sea-water

through the faucet *i*, the water rising to the level of the line *a*, before the capacious outlet siphon *s* begins to operate. This siphon, through which the water runs out of the trough faster than it comes in at *i*, soon brings the water down to the level of the line *b*, when the siphon takes in air and ceases to operate, after which the trough again slowly fills up with water to the level of the line *a*. This process is repeated automatically, and as long as the water is permitted to flow through the device. It requires ten minutes for the water to rise or fall from the one level to the other; and, since the jars have only a cloth tied over the mouth below, the water rises and falls to the same extent in them. This very slow and gentle rise and fall of the water in the jars and trough have been found sufficient to aerate the eggs, and give them all the movement they need.

The majority of the eggs in this contrivance float at the surface. Some, of course, remain suspended below the surface; but an exceedingly small percentage of the eggs ever sink and die, as in almost all of the other forms of apparatus hitherto used. The result is that the mortality is probably under five per cent, — a percentage of loss not greater than that experienced in the most successful treatment of shad ova.

The freshly fertilized ova, treated with an abundance of good milt, are introduced into the hatching-device through the hole in the centre of the bottom of each jar by means of a glass funnel. Beyond an occasional siphoning-off of the sediment on the bottom of the trough and the cloth covers of the jars, the eggs require no attention until hatched.

Heretofore great mortality has been caused by the use of metal in the construction of the hatching-vessels and strainers. Since the adoption of glass, wood, and cloth as the only materials used in the construction of the hatching-apparatus here described, combined with the very gentle movement to which the eggs are subjected, complete success has been attained. The eggs oscillate up and down through a space of only five inches from the level of *a* to that of *b*, and, withal, so gently that they suffer no hurtful shocks of any kind whatever. Captain Chester's device will doubtless be used with great advantage in the propagation of the Spanish mackerel. In twenty-four hours the latter would be ready to be set free from the apparatus; whereas it requires eleven or twelve days to hatch the eggs of the cod, with the temperature of the water ranging from 45° to 48° F.

Each of the jars *J* is seventeen inches high by nine inches in diameter, and will hold from one-half to one million of cod-eggs; so that an apparatus of the style shown above, and occupying not much over a square yard of space, would accommodate from two to four millions of ova, in four jars.

These experiments show that violent movement of the eggs of the cod is of no advantage; that such movement is, on the contrary, injurious, if not mortal, when continuously maintained. The requisite conditions for successful hatching of this important food-fish having been settled, the great station of the fish commission at Wood's Holl affords unlimited opportunities for conducting the work for at least three months of the year, during which time from five hundred to one thousand millions of eggs might readily be hatched out by the aid of the Chester apparatus, and set free in the adjacent waters.

Since my arrival here, I have observed, that, some days after hatching, the larval integument over the head of the embryo cod is raised more and more from the top and sides of the brain. A spacious serous cavity is thus formed over the brain; so that, when the embryo is viewed from the front, it seems as if it bore a sac on the head almost as large as the yelk-bag formerly had been, attached to the top and sides of the head. On account of the fact that the young larvae of the cod seem to delight to remain near the surface, it has occurred to me that this vesicular sinus above the brain is of use in buoying the young embryos up after they have escaped from the egg. That this is actually true, I have every reason to believe from the circumstance that embryos a few days old never rest in the water in a horizontal position, but with the head uppermost, and the tail slanting backward and downward from it at an angle of 45°. When swimming, they move horizontally; but at once, upon coming to rest, the young fish assumes a slanting attitude, the tail dropping down into the inclined position, while the head is thrown up. The large sinus here described was first observed by me, in a less developed condition, on the head of the embryo Spanish mackerel in 1880. The space in this sac in that species I called the supracephalic sinus.

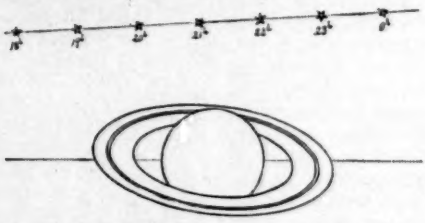
Since the foregoing was written, we have discovered that the specific gravity of the sea-water has a great deal to do with the healthy development of the eggs of the cod. By accident a broken valve admitted some fresh water to our salt-water tank, causing the specific gravity to fall from 1.0256 to 1.021 or 1.022. In this density the eggs immediately sank, causing us to lose over two millions. After this unfortunate experience, and also judging from the fact that ever since the break in the valve has been

mended no eggs have gone down, we have concluded that it is natural for cod-eggs to float, and that under no other conditions will normal development be accomplished. JOHN A. RYDER.

Wood's Holl, Dec. 21.

CLOSE APPROACH OF SATURN AND μ GEMINORUM.

ON the night of 1886 Jan. 9 (or morning of the 10th, civil time) there will occur a very close approach of the planet Saturn to the star μ Geminorum, whose magnitude is given as 3.22 in the Harvard photometry. The figure below gives the relative configurations of planet and star for successive hours of Greenwich mean time (astronomical) as seen in the ordinary inverting telescope.



To see it as it will appear to the naked eye, with an opera or field glass, or with a telescope having a terrestrial eyepiece, turn the diagram bottom upwards. At the time of nearest approach to the centre of the ball (a little after 21^h) the star will be about 26″ from the centre, or 16″ from the edge of the ball. For convenience the planet is figured as stationary, and the star as moving by it. Of course, the planet (as seen in the telescope) moves to the left, parallel to the line through the successive positions of the star. The dotted line through the planet's centre is parallel to the earth's equator, and makes an angle of 6° 35′ with the major axis of the rings. The time of nearest approach is about five hours after the transit over the meridian of Washington, and is well visible over the whole of this country, though of course best for the Pacific slope, where it will not be so far down in the west. To convert the times given above into the standard civil times, add 7^h, 6^h, 5^h, and 4^h respectively, subtracting 24^h if necessary, which carries it into the civil day of Jan. 10.

Astronomically the event is of very little importance compared with what an actual occultation by the ring, or by the ring and ball, would be. A star as bright as this, and behind the rings, would offer a test we have never had yet of their possible transparency through interstices in the probable cloud of satellites. The action of the dusky ring (not indicated above) would be especially interesting. A central occultation by the ball would give, by means of micrometric measures and the duration of the occultation, a sharp test of the refracting power of Saturn's atmosphere, and the possible semi-transparency of its upper cloud-surface. So near an approach of Saturn to a star as bright as the 3.22 magnitude is an exceedingly rare event. Assuming that the distribution of stars brighter than the 3.22 magnitude along Saturn's path is the same as the average, we find that only once in 612 years will Saturn approach so near one of them as on 1886 Jan. 9. Of course, actual occultations will be still more rare, and only likely to occur by the ring once in about 1,730 years, and by the ball only once in a little over 2,000 years. So near and yet so far from an actual occultation is the coming event.

H. M. PAUL.

THE CONVICT-LABOR PROBLEM.

THE attention of philanthropists and students of social science, which has for a long time past been turned toward this subject, has been increased of late by the attitude of the labor agitators. Perhaps not more than one out of every ten thousand laboring men gives the question of convict-labor competition a thought, but this odd one has during the last decade managed to stir up a great deal of discussion.

That convicts should be employed, and employed, if possible, in a manner profitable to the state, is a proposition that no sane man controverts. Now, there are various ways of employing convicts; and the agitators insist that one of these ways — the one, it so happens, which has in the past produced the largest revenue to the state — has an injurious effect upon the honest laborer by compelling him to submit to an unfair competition. Strange to say, this clamor has had some effect; though how sixty thousand convicts, — the whole number in the United States, according to the last census, — working as they do under peculiarly disadvantageous circumstances, and consisting of the lowest and most ignorant classes of the population, can effect any appreciable competition with the millions of honest and free workingmen, it is difficult to conceive. Those who join in this outcry are to a great extent communists, and leaders of labor organizations, whose sustenance depends upon the amount of agitation they can create, together with such political aspirants as aid them for purely selfish purposes.

The effect of all these elements combined has been visible in the statute-books of several states. Among these is New Jersey, whose legislature

passed a law, Feb. 21, 1884, abolishing the system of contracting for the labor of prisoners at so much per day, and followed it up with a law, dated April 18 of the same year, directing the introduction of the 'public-account' or 'piece-price' plan, as the prison authorities should decide. The contract system, it was claimed, was the source of the unfair competition complained of, and these laws were passed under the agitators' influence expressly to prevent such competition.

The new law took effect on the expiration of the old contracts, in July, 1885, and in the reports of the prison officials for the current year we have a summary of the results obtained thus far; and, inasmuch as several states are having the same experience as New Jersey, the conclusions reached by her officials in this matter are of general political as well as scientific interest.

The 'public-account' plan was so generally discredited, that the officials adopted the other alternative under the law; namely, the 'piece-price' plan. Under this system, the contractor pays a fixed price per dozen, gross, or thousand for work done on materials furnished by him. The introduction of this radically new system occasioned some delay for the purchase of machinery, fitting-up of shops, etc., and the authorities are cautious enough to state that their experience of the new system has been too limited to admit of unqualified indorsement or condemnation. Nevertheless, all the facts and figures presented in these reports point in the same direction. They prove that not only does the state treasury lose largely by the change from the old contract system, but that the contractors are enabled to put their goods on the market at a less cost for manufacturing than ever before; so that, as far as there is any competition with free labor, it is greater under the 'piece-price' plan than it was before. This is a result which reflects upon the sagacity of the agitators themselves; for, if their pet system can be proved injurious on so short a trial, their stock in trade is exhausted.

One contractor who under the former system paid fifty cents per day for the labor of every convict, skilful or unskilful, who went into his shops, now averages less than half that sum per convict. In one or two cases the contractors now pay a few more cents per day's labor than formerly, but this apparent gain results from greatly increasing the quantity of the work; so that, even with an apparently similar financial result to the state, the product is manufactured cheaper now than under the contract system.

These early conclusions from this new departure are interesting. They show that the labor agitators are many, and the mass of political scientists and humanitarians are right in upholding the contract system as the best and most profitable for the employment of convict-labor. Reasonable limitations to the operation of the contract system may very possibly be suggested by experience; but these data from New Jersey ought to insure the rejection of the 'piece-price' plan everywhere, or else some radical modifications in its details.

NICHOLAS MURRAY BUTLER.

NOTES AND NEWS.

THERE is not much to be said of the popular-science articles in the December magazines, for there are not many of them; and what there are, are very popular, though quite interesting. The *Atlantic* adds another to the already long list of reviews on the recent 'Life of Agassiz,' but fails to say, what seems tolerably obvious, that the time has not yet come when the value of Agassiz's scientific labors, or indeed of his influence on the progress of natural history in the United States, can be correctly estimated. John Burrows, in the *Century*, gives, in very readable form, some notes on bird enemies, — jays, owls, vermin, mice, snakes, and 'collectors.' In *Harpers' magazine* there is a highly aesthetic article called 'A winter walk.' It is beautifully illustrated, and well adapted to the wants of ladies of scientific turn of mind. Perhaps the author tried to imitate Thoreau; but if he did, he failed. To persons interested in ornithology, Mr. Edward C. Bruce's article in *Lippincott's magazine*, on 'Birds of a Texan winter,' will doubtless be entertaining. After mentioning a few of our birds that do not migrate, Mr. Bruce goes on to tell us of the northern birds he has seen in Texas during the winter, — plovers, herons, wild geese, etc. The English magazines have even less than the American on natural science this month. There are only two articles to be mentioned. One is by Benjamin Kidd, in *Longman's magazine*, on the 'Humble-bee,' and gives some description of the habits of this insect, based, it would seem, largely on the author's personal observation. The other is by W. Mattieu Williams, in the *Gentleman's magazine*, and is called 'Science notes.' The topics dealt with are, the origin of boracic acid, meteoric explosions, magnetic sifting of meteorites, fireproof paper structures, the future of the negro, the sleep of fishes, and icebergs and climate.

— The dog by which Kaufmann, who is now in Paris for treatment under Pasteur, was bitten, is shown conclusively to have been mad, a dog bitten by it nearly at the same time having since died of unmistakable rabies.

— Prof. Edward Süss delivered in the Geo-

logical institute of Vienna, on Nov. 3, a lecture on the means of preventing explosions in coal-mines. Experiments have been made in the Karwin colliery in order to obtain, if possible, positive results, and these experiments are still being continued. It has been demonstrated that whenever the barometer falls, the quality and intensity of explosive gases increase. The Austrian government has directed that the weather-charts published shall be provided by all the managers of coal-mines in that kingdom, and at Karwin a regulation is in force to the effect that at the approach of a barometric depression all work is to cease in dangerous places.

— The 'Report on the geology of Marion county, Kentucky,' recently published, is in many respects a curiosity. The history, topography, and drainage, treated of in five pages, is followed by the geology in fourteen pages, archeology in five pages, and a list of fossils and notes on Beatricea in eleven pages. The following selection will illustrate the style of the report: "The soil from the disintegration of the Crab orchard shale is quite poor, and responds very slowly to the toils of the farmer; while the forest growth is very much dwarfed, although similar in species to that of the tall, well-shaped, large-sized timber-trees of the epoch before it. The forests originally were well timbered" (p. 17). This last sentence is particularly remarkable.

— Most of the rivers of New South Wales fall into the sea through sandy estuaries obstructed by extensive bars. The removal of these bars, or rather the formation of practicable channels through them, is of great importance to the development and trade of the colony. A paper on this subject was read before the Royal society of New South Wales in June, 1884, by Mr. Walter Shellsbear. The formation of bars at the mouths of rivers is stated by the author to be mainly due to the action of waves in lifting large quantities of sand as they pass into shallow water. The sand is carried up the estuary by the incoming tide, and deposited when beyond the action of the waves. The ebb-tide, being unassisted by the waves, is unable to remove the sand, and hence the tendency is to close the entrance. While strong freshets may for a time sweep a portion of the obstruction away, the frequent occurrence of long droughts in New South Wales leaves the river-mouths in a very bad state. The author advocates the use of break-waters, jetties, and training dikes, more or less parallel, and running out into deep water, three and a half fathoms or more, — a depth beyond which the waves are stated to have no appreciable effect on the bottom.

LONDON LETTER.

One of the matters which grew out of the education conference at the International health exhibition in London in August, 1885, some account of which appeared in the columns of *Science*, was the proposal for the establishment of a teaching university for London. The present University of London is mainly an examining board. In the case of its medical degrees, attendance upon specified courses of instruction in one or other of the medical schools recognized by the university is compulsory. The degrees in arts, science, etc., may be obtained by any persons, of either sex, who can satisfy the examiners as to their attainments, no matter whether that knowledge has been acquired by private study, private tuition, or college attendance. In point of mere attainment, the London degrees rank higher than the corresponding degrees of any other university; but they do not imply, as those of Oxford, Cambridge, etc., do, that their holder has been taught in colleges by men of university rank and standing, and according to university methods. The scheme of examinations laid down by the senate of the University of London naturally exercises a very wide influence upon the subjects taught in schools and colleges all over England; since more than two thousand candidates annually enter for the matriculation, or entrance examination, of the university. As there is no official connection between the senate and examiners on the one hand, and the principal professors and teachers on the other, the latter (some of whom are men of the greatest eminence and of world-wide fame) naturally feel aggrieved at the dominant influence which the university exercises over their courses of instruction, since they are practically compelled to teach those subjects prescribed for examination, and almost those alone. Moreover, there is a growing feeling that the enormously wealthy guilds and companies of the ancient city of London will be shortly compelled, either by actual legislation or by the potent force of public opinion, to appropriate more of their funds than they at present do, to educational purposes. These were the two main ideas which led to the formation of the Association for the promotion of a teaching university for London. On this body are representatives of all the principal educational institutions of London, in the four great faculties of arts, science, laws, and medicine. Large bodies take time to move, and, where there is much diversity of opinion, it is very difficult to formulate a scheme which shall meet with the acceptance even of a bare majority. This desirable stage has not yet been attained. The members of the existing university of London, however, naturally had to con-

sider what should be their attitude towards the new body. Accordingly, at a very full meeting of convocation (as the general body of graduates above a certain standing is termed) last summer, the whole subject was referred to a special committee of forty (of which the present writer was a member), to consider and report. This committee appointed Lord Justice Fry its chairman, and a scheme was by it prepared for the re-organization of the existing university from the points of view of the new association, — a task the more easy, as several gentlemen were members of both bodies. At an adjourned meeting of 'convocation' held on Dec. 8, this scheme was rejected, and, as the former committee refused to act, another committee of twenty-five was appointed to modify it in the sense indicated by convocation.

The year which is now drawing to a close has been marked by greater losses to English biology than any since 1882, which witnessed the deaths of Mr. Darwin, Prof. Francis Balfour, and Sir Wyville Thomson. Prof. Morrison Watson was a well-known anatomist of hardly more than middle age; while Drs. W. B. Carpenter, J. Gwyn Jeffreys, and T. Davidson were almost the last of that older school of zoölogists who are too often looked down upon by the younger generation which has been trained to minute histological work. Dr. Davidson had the happiness of completing the work to which he had devoted the labors of a long life; but his two old friends have left much material behind them, the working-out of which must be completed by other hands. Dr. Carpenter's loss will be severely felt by those who believe in the organic nature of eozoon. He had accumulated a very great amount of material, which was regarded by all to whom he had shown it as proving his case in the most satisfactory manner possible.

An important reform has just been carried out at Oxford. Honor candidates in law, history, and science, will henceforth be excused from the classical examination at the end of their first, or the beginning of their second, year, which is known as 'moderations.' The preliminary examination 'responsions' can be passed before residence begins, either in the leaving examination of a public school or at the university itself; and men can therefore specialize during the whole of their university course, instead of having their attention distracted from physics, chemistry, or biology by the necessity of getting through 'mods.' This has long been the case at Cambridge, and is one of the reasons for the overflowing state of its medical school.

The old public schools are also beginning formally to recognize that there are other branches of education besides the classics. Rugby is about to institute a modern side; and changes in the same direction are being gradually introduced at Eton, her great rival, Harrow having long had something of the kind. The committee of the city and guilds of London institute for the advancement of technical education have offered free studentships of the annual value of thirty pounds, tenable for three years at the central institution, to be awarded by the head master of each of the principal public schools. It will be a matter of some interest to see what proportion of boys will avail themselves of these opportunities for obtaining the higher technical education.

W.

London, Dec. 17.

LETTERS TO THE EDITOR.

***, Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

The moon's atmosphere.

MY friend, Professor Langley of Allegheny, has recommended to me to give you an account of a phenomenon twice observed by me on the occasion of two occultations of Jupiter. At the moment of contact, the planet, instead of passing behind the moon, appeared to be projected upon the moon's edge, until nearly or quite one-half of the disk of the planet was visible on the moon's surface. Then suddenly the whole planet disappeared behind the moon. As this phenomenon must be due to refraction, it would indicate a lunar atmosphere. The instrument with which I observed the occultation was a telescope made for me by Alvan Clark, with a four-and-a-half inch aperture. JAMES FREEMAN CLARKE.

Jamaica Plain, Mass., Dec. 31.

Demand for good maps.

Your comments in the number for Dec. 18, on the character of our small maps, are to me very welcome, and I hope you will follow the subject up till some decided impression is made on the minds of the publishers. The maps in our school geographies are, to me as a teacher, a constant source of vexation. Indistinct, incomplete, inaccurate, they baffle attempts at close work, and so compel, if solely depended upon, a very elementary grade of work. The small *schul-atlas* that a German boy buys for twenty-five cents is worth ten times as much as our best geography maps.

You spoke of old plates. I have seen within two years a wall-map of North America in which the Yukon River had not been drawn. Said map was shown as a sample in the office of one of our largest publishing-houses.

When the German publishers bring out their work so perfect, it seems as if the material was provided for American geography-makers. Is the reason they do not use it because, with German lettering, the maps cannot be reproduced by the photographic process and be available? Or are they afraid of repeating the mistake of one of our atlas-makers, who produced a town in Africa called Elfenbein?

However it may be, we do need better school-maps.

They should be maps in which the various features of surface are clearly, carefully, and fully drawn. I do not mean maps full of names, but full of features. To illustrate: Where are the Alps? The Alps are in Switzerland; and the schoolboy finds on his map 'Alps' printed on the south side of that portion labelled 'Switzerland.' A good map would show at least four ranges there; and proper maps of Austria, Italy, and France, would teach him that 'Alps' is a generic term with at least thirteen applications in southern Europe.

Norway and Sweden appear on most school-maps with but one or two rivers, because, I suppose, there is no long and large stream there important enough to have its name memorized; but what an idea does such a map give of that country? I can count over sixty rivers there on a map in Andree; and enough of them should be drawn, even if without naming, to show the true character of the surface.

Similar instances could be given by the dozen. But I want to take up another point. When are we to see a geography with an index? Studying geography by the topical method, an index is well-nigh indispensable. By any method, twice as effective work can be done if the material can be viewed from the stand-point of the kind of feature, production, occupation, or race, as well as in relation to this or that political subdivision.

I do not think it too much to insist on, that every ocean, sea, gulf, bay, strait, channel, lake, sound, harbor, canal, river, waterfall, bight, firth, bayou, roadstead, etc.; every land feature, every product, occupation, language, religion, form of government, town and political division, — in short, every thing namable that has been mentioned in the text or appeared by name in the maps, — should be indexed by page or section, and, in case of map features, with latitude and longitude.

Why, even in Morden's 'Geography rectified,' published in 1693, there is a copious index, not to mention later works (1809, 1831) likewise favored.

With an index to aid him, a scholar can classify, compare, and infer; and the value of the text-book would be doubled.

Nor would it be difficult to mention other ways in which our geographies could be improved. But if we can first have some better maps and an index worthy the name, we shall have gained much. I hope you will not be content with a few leaders. The matter is one of no slight importance. Perhaps, if our publishers read Prince Kropotkin's article in the December number of the *Nineteenth century*, they would be inspired to do better. Let us hope they will.

C. H. Leete.

New York, Dec. 31.

The temperature of the moon.

Mr. Langley does not seem to have examined my condition for determining the moon's temperature with sufficient care. It is true that in the equation a moon of maximum radiating power was assumed; but it had been first shown that the temperature of such a moon must be the same as that of any other, provided the relative radiating and absorbing powers are the same, as is usually assumed. The equation is between the absolute rate of radiation and absorption of heat, in which r, the relative radiating power, enters as a factor on the one side, and a, the relative absorbing power, on the other. If these are equal, of course they can be omitted, which is the same as using unity as the relative radiating and absorbing powers, and so the same as assuming that the moon has a maximum relative radiating and absorbing power. The relative radiating and absorbing powers, and the proportion of heat reflected, do not, therefore, come into the condition at all. It cannot be said with propriety that the moon loses heat by reflection, as stated by Mr. Langley; for the reflected heat has not been appropriated by absorption, and therefore cannot be said to be the moon's heat. It has come to the moon's surface and been rejected, and it has nothing to do with its temperature. The condition which determines the static temperature is, that the rate with which heat is radiated must be exactly equal to that with which it is absorbed. When this is the case, there can be neither increase nor decrease of temperature.

But perhaps this matter will be more readily comprehended by looking at it in a less mathematical way. We have a moon, say, with a surface of maximum relative radiating and absorbing power, and with a temperature below the static temperature corresponding to the rate with which it is receiving heat. With this temperature, the absolute rate with which the moon radiates heat is less than that with which it is receiving and absorbing it, and the difference goes toward raising the temperature of the body. But as the temperature increases, and with it the rate of radiating heat, though not proportionally, it after a time rises to that temperature at which the rate with which heat is radiated from the moon is exactly equal to that with which it is received and absorbed by it, and its temperature then remains stationary. This, expressed in a mathematical form, is the equation of condition.

But now suppose that the moon's surface is such that it radiates and absorbs heat at only half, or any other proportion, of the rate that one of maximum relative radiating and absorbing power does. Our condition is still satisfied; for although the moon's surface now is radiating heat at a rate which is only half, or any other assumed proportion, of what it was before, it is also absorbing at only the same rate, whatever it may be, and there is no change of temperature needed to satisfy the condition of static temperature. Hence, so far as the static temperature of the moon is concerned, it is no matter what part of the heat received is absorbed, and what reflected; these being complementary to each other, and both together equal to the heat radiated by a moon of maximum relative radiating power, under the condition of a static temperature. Of course, our condition for determining the temperature is not applicable where there is a rapid increase or decrease of temperature.

Wm. Ferrel.

Washington, Jan. 4.

Yankee.

In a paper upon the origin of 'Yankee Doodle,' read lately before the New York historical society, Mr. George H. Moore states that the word 'Yankee' is pure Dutch. 'Yankin,' he says, in the vocabulary of the early New York Dutch, meant 'to grumble, snarl, or yelp,' and its derivative noun meant 'a howling cur.'

But where did the New York Dutch get the word? I think from the Indians. Peter Martyr says that Sebastian Cabot named the coasts of Newfoundland and thereabouts the land of baccalaos, because in the seas he found a multitude of large fish which

the natives called by that name. This word 'baccalaos' was used by the Basque fishermen, and meant 'codfish;' and, if the natives used it, it was only after they had learned it from the Basques.

Sailors are proverbially profane, and most likely these sailors of the olden time made use of the name of the Deity, much as sailors do at the present day. The Basque name for God is 'Yainkoa,' and no doubt it was frequently used by the fishermen; so frequently, indeed, that the Indians called the strangers by it, just as the little urchins of Havre and Dieppe now call the English tourists 'Meestaire Goddam.'

The Indians employed the term to indicate a foreigner, and from them the early colonists learned it. It may afterwards have passed into a word or term of contempt, but it had its origin in the attempt of the Indians to pronounce the Basque word 'Yainkoa.' TH. E. SLEVIN.

San Francisco, Dec. 26.

'Chinook winds.'

In an article by Mr. Ernest Ingersoll, on the Canadian Plains, in the last number of *Science*, the so-called Chinook winds of that portion of these plains adjacent to the base of the Rocky Mountains, are described as warm, dry winds 'sweeping up from the great Utah and Columbia basins.' In a previous number of *Science* (iv. 166) Mr. Lester F. Ward, in speaking of similar winds in the upper Missouri and Yellowstone valleys, says, "It is also a matter of record that the temperature on this latitude diminishes toward the east, and that colder weather prevails in Minnesota than in Dakota, and in Dakota than in Montana. The people attribute this to the occurrence of what they denominate 'Chinook winds;' i.e., winds laden with moisture, and moderated in temperature from the warmer regions of the Pacific slope." By the inhabitants of the region in which these winds occur, they are very generally explained as currents of air coming from the warm surface of the Pacific Ocean, and flowing eastward through the low passes in the mountains.

Having had occasion to note the character and effect of these peculiar winds while engaged in geological and exploratory work in the western part of the plains and in the mountains at different times during the last ten years, I may be pardoned for stating my belief that the above theories are unsatisfactory, and based on hasty or imperfect consideration of the facts.

As experienced, the Chinook is a strong westerly wind, becoming at times almost a gale, which blows from the direction of the mountains out across the adjacent plains. It is extremely dry, and, as compared with the general winter temperature, warm. Such winds occur at irregular intervals during the winter, and are also not infrequent in the summer, but, being cool as compared with the average summer temperature, are in consequence then not commonly recognized by the same name. When the ground is covered with snow, the effect of the winds in its removal is marvellous, as, owing to the extremely desiccated condition of the air, the snow may be said to vanish rather than to melt, the moisture being licked up as fast as it is produced.

Winter winds of this character occur over a tract of country stretching at least as far north as the Peace River (north latitude 56°), and at least as far south as northern Montana,—a distance of about six hundred miles. In the corresponding portion of its length, the Cordillera belt is comparatively strict and narrow, the western edge of the plains being separated from the ocean by about four hundred miles only of mountainous country. In this circumstance, taken in connection with the moisture-laden character of the air along the northern part of the west coast, we find a clew to the correct explanation of the remarkable characteristics of the so-called Chinook wind. It is in effect, I conceive, precisely similar to that of the *foehn* of the Alps, and is due to the great amount of heat rendered latent when moisture is evaporated or air expanded in volume, but which becomes again sensible on condensation of moisture or compression of the air.

To meteorologists the phenomenon requires no further elucidation; but as it is one which attracts much attention in the west, owing to its important effect in removing the snow from the grazing-lands, the following more detailed notice, written by me with special reference to the Peace River country, may be of interest (quoted, with little alteration, from the Report of progress, geological survey of Canada, 1879–80, p. 77 B.): —

"The pressure in the upper regions of the atmosphere being so much less than in the lower, a body of air rising from the sea-level to the summit of a mountain-range must expand; and this, implying molecular work, results in an absorption of heat and consequent cooling. The amount of this cooling has been estimated as about one degree centigrade for a hundred metres of ascent when the air is dry, but becomes reduced to half a degree when the temperature has fallen to the dew-point of the atmosphere, and precipitation of moisture as cloud, rain, or snow begins; the heat resulting from this condensation retarding to a certain degree the cooling due to the expansion of the air. When the air descends again on the farther side of the mountain-range, its condensation leads to an increase of sensible heat equal to one degree centigrade for each hundred metres.[1] It is owing to this circumstance that places in the south of Greenland, on the west coast, during the prevalence of south-easterly winds, which blow over the high interior of the country, have been found, in winter, to experience a temperature higher than that of north Italy or the south of France, though the North Atlantic Ocean, from which the winds come, can at this season be little above the freezing-point. The wind well known in the Alps as the *foehn* is another example of the same phenomenon. It is thus easy to understand how the western plains may be flooded with dry air, but much inferior in temperature to that of the coast, notwithstanding the intervening mountain-barrier.

The data are yet wanting for an accurate investigation of the circumstances of our west coast in this regard, but a general idea of the fact may be gained. We may assume that the air at the sea-level is practically saturated with moisture, or already at its dew-point; that in crossing the mountainous region the average height to which the air is carried is about 2,000 metres (6,560 feet), and that it descends to a level of about 700 metres (2,296 feet) in the Peace River country. The loss of sensible heat on elevation would in this case amount to 10° C. (18° F.); the

[1] The figures are Dr. Hann's, quoted by Hoffmeyer in the Danish geographical society's journal, and reproduced in *Nature*, August, 1877.

gain on descent to the level of 700 metres, to 13°C. (23°.4 F.). The amount of heat lost by the air during its passage across the mountainous region by radiation, and contact with the snowy peaks, cannot be determined. It is, of course, much greater in winter than in summer, and depends also on the speed with which the current of air travels.

Owing to the width of the mountain-barrier, the main result is complicated by local details; regions of considerable precipitation occurring on the western slopes of each important mountain-range, with subsidiary drier regions in the lea. The last of these regions of precipitation is that of the Rocky Mountain range properly so called, in descending from which a further addition of heat is made to the air, which then flows down as a dry and warm current to the east. GEORGE M. DAWSON.

Ottawa, Canada, Dec. 31.

The Taconic controversy in a nutshell.

The New York geologists encountered a great group of metamorphic, apparently successive and conformable strata, extending from the Hudson River eastward into New England (1836–42).

Emmons claimed they were all older than the Potsdam, and named them all Taconic. His colleagues of the New York survey, and their friends of the Canadian survey, regarded them all later than the Potsdam, and applied to them the terms of the New York system up to the Medina (1842).

Fossils were discovered in some of the eastern belts of this metamorphic series, and announced by Hall and others in 1842, rather indicating the whole series was post-Potsdam.

Emmons re-examined the whole, and called attention to an unconformable overlying of the Hudson River and calciferous upon the older slates of the true Taconic, and distinctly re-asserted the pre-Potsdam age of the Taconic system, from which he figured primordial fossils (1844). He was supported by Billings and Barrande, and by Colonel Jewett of Albany, but as time passed he was ostracized from geological circles.

The authority of Barrande, however, was sufficient to convince the opponents of Emmons on the New York and Canadian surveys, and they expressed a willingness to abandon the use of the conflicting term, 'Hudson River group' (1862).

The Canadian geologists, however, fertile in the invention of devices of stratigraphic nomenclature, renewed the contest by two flank movements, — one the Huronian phalanx, aimed at the lower strata; and the other, the 'Quebec coffin,' aimed at the overlying strata, thus rallying the whole discomfited cohort (1855–61). Emmons died in the midst of this movement.

As time passed, the term 'Hudson River group,' besmirched and hesitating, was re-habilitated by being shifted to new ground, — that of the Lorraine shales (1877).

In Wales, Barrande had discovered the 'primordial zone' in Sedgwick's 'Cambrian;' but, as the Sedgwickian term was then under as strong a ban in England as 'Taconic' was in America, Barrande's term was adopted in England, and also transferred to the equivalent strata in America.

Gradually, in other places outside the Hudson valley, the primordial fauna came to light, the strata taking other Canadian names, — St. John's and Acadian; these terms becoming current in the United States.

Finally the existence and fossiliferous character of a great series of strata, occupying exactly the position, claimed by Emmons, and mapped by him under the term 'Taconic,' lying below the Potsdam sandstone, has been demonstrated, and is admitted by all geologists.

The term 'Quebec' not being approved, and 'Huronian' seeming to collide, the later English term, 'Cambrian,' is applied in America to this very horizon to which Emmons had given the name 'Taconic.'

Some of the opponents of Emmons, re-enforced lately by active, younger men, revive the fossiliferous character of some of the eastern belts as new matter, adding many interesting and valuable details, and begin again to fire at the old fort, long ago abandoned by Emmons, insisting that Emmons is still intrenched there (1872–85).

It seems to me that any fair-minded geologist, finding primordial fossils in the strata mapped by Emmons as Taconic, lying below the Potsdam, would at once admit the strata to be Taconic; just the same as, if he found non-Taconic fossils in an area not claimed as Taconic, except by a mistake in a preliminary definition (corrected by its author), he would at once admit those strata were not in the Taconic, and were not intended to be so described.

The same mistake was made by Emmons at first as by his opponents. None of them imagined they had to deal with two different and unconformable formations. The strata were all either Taconic or Hudson River. Emmons approached them from one side, the primordial, and his opponents from the opposite direction. Each had evidence to support his claim; and, viewed from his own stand-point, each was right. It is unfair to Emmons, and to American geology, to insist that this preliminary mistake should consign to oblivion the great fact that in America, and by an American geologist, was first discovered the primordial zone of geology.

If the Taconic is to 'lose its identity' because a portion of the original described strata prove to be post-Potsdam, what shall become of the Hudson River, by the same reasoning, if it be treated with honesty, when nearly all the strata covered originally by it prove to be pre-Potsdam? If the strata can fairly be divided between the conflicting claims, as the structural geology of the region seems to require, it would be for the honor of American geology to so divide them. It seems, however, that the extreme anti-Emmons partisans will not grant such a division, but insist on the utter destruction of every thing that smacks of Taconic. N. H. WINCHELL.

Relics from an Indian grave.

On the Conejo plateau in Ventura county, Cal., and about fifteen miles from the coast, a conical hill rises to the height of a hundred feet, with a base of several hundred feet. On the south side of this elevation, and stretching more than half around it, is the remains of an old Indian town. At the top of the hill is a circular depression, indicating the spot where once stood the 'sweat,' or council-house, of the tribe that occupied this site. Near the centre of the crescent-shaped village is the place where the dead were buried. Early last month the writer examined this burial place, which yielded about a hundred and

fifty skeletons deposited from one to five feet below the surface. The usual method of sepulture practised by the Santa Barbara stock of Indians prevailed here; namely, the knees were drawn up against the breast, and the corpse was buried face downward.

With the skeletons were found three ollas carved from crystallized talc, which were used for cooking-purposes; two large sandstone mortars, finely finished, used for triturating grain and acorns; a sandstone bowl about one inch deep and six inches in diameter; two conical pipes and several large beads of serpentine; several sheets of mica with hole drilled at the side; a broken tortilla stone; several balls of paint; and thousands of shell and glass beads, wampum, ornaments, etc. In a Haliotis shell (H. splendens) I found eight old fashioned flat brass buttons, with numerous specimens of wampum, manufactured from Olivella biplicata. The remains of a metal knife were discovered, which, with glass beads, buttons, and a portion of an old-fashioned water-bottle, shows that this place was inhabited since the advent of the white man, or within the past three hundred and forty-three years.

Probably the most interesting relic discovered was a metal fish-hook. It has a shank about four and a

half centimetres in length, with a point about three and a half centimetres long, which, from its shape, I should judge was of Indian manufacture. An Olivella shell was scalloped or notched, leaving it somewhat in the shape of a crown. The base was perforated, and the shank of the hook pushed through it. This was doubtless intended as an attraction to the fish. The species is Olivella biplicata, some of which are very white, and, at the end of a line, would be nearly or quite equal in brilliancy to the pearl oyster-shell used by the South-Sea Islanders for the same purpose. By the kindness of the publisher of *Science*, an engraving of the fish-hook is presented. It is in a somewhat restored form, the original being corroded to some extent by rust.

STEPHEN BOWERS.

San Buenaventura, Dec. 8.

New find of fossil diatoms.

Seeing a reference to diatoms occurring in clay strata in a railroad-cutting near Philadelphia, in two of the recent issues of *Science*, I wrote to Dr. Koenig, the discoverer, for a sample of the diatom-bearing clay. I received the clay promptly, and am delighted to be able to say, that, after a five-minutes' preparation, I had the pleasure of noting a very rich slide containing at least thirty species of diatoms; the forms corresponding chiefly to the recent fresh-water forms, but characteristically different, as relates to the association of the species, when compared with the forms occurring in the sub-peat deposits of the eastern United States.

My reason for making this communication is, that the value, interest, and importance of this new find of diatomaceous material has not been sufficiently emphasized in the two articles in *Science*, and might be overlooked by diatomists, and all who are on the constant lookout for new localities of fossil diatoms.

K. M. CUNNINGHAM.

Amœboid movement of the cell-nucleus.

The study of the cell-nucleus has become a subject of such absorbing interest in biology, that we feel justified in asking a little of your space to make known what seems to us a promising field for investigation. During the last year, in studying the blood of Necturus, after its removal from the body and in the blood-vessels, we were struck with the great size and distinctness of the nucleus of the white corpuscles. But what seems especially interesting and important is the fact that the nucleus of the white blood-corpuscles exhibits a very marked amœboid movement, both in the vessels of a curarized animal and on the microscopic slide. These movements are as vigorous and easily followed as are those of the cell-body; and often both the cell-body and nucleus are undergoing amœboid movement at the same time, the movements of the cell-body and nucleus seeming to be entirely independent of each other. From the ease with which the white corpuscles are obtained and observed, from the size and activity of the nucleus and its distinctness in the living condition, it is confidently expected that the study of the white blood-corpuscle of Necturus will greatly assist in making more definite our knowledge of the nucleus, its so-called membrane, and the processes of its division.

S. H. and S. P. GAGE.

Anat. lab. Cornell univ., Dec. 25.

English sparrows.

In *Science*, Dec. 18, appeared some remarks on the English sparrows that do not at all agree with our experience here. We have many orchards and groves in and around our village. Many of us have provided boxes for wrens, martins, bluebirds, etc. Robins, cardinals, crimson-breasted grossbeaks, catbirds, etc., are innumerable around us. A few years ago some of our people, accustomed to watch the many kinds of birds that frequent our court house grove, asked me about 'a little bird that had just newly appeared in the grove.' They said that it was "driving all the other birds away. Not content with merely fighting and mastery, it drove the others clear out of the town." The people had been watching them for some days, and reported that half a dozen birds had actually made themselves the sole possessors of our melodious grove, heretofore so delightfully noisy with the songs of the many native birds. I suspected the cause, and, as soon as I saw the 'strange little birds,' pronounced them to be those 'winged rats,' the English sparrows. For twenty years I had kept several boxes for martins at my own place. About thirty pairs were making their homes at my doors. Suddenly I missed them, but the screech of a pair of English sparrows took

their place. Well, we exterminated these sparrows, and our birds came back. C. I.

Oregon, Mo., Jan. 1.

The discussion of the merits of the English sparrow, as shown in the contributions to *Science*, indicates a wide difference of opinion. Some of the conclusions reached by your contributors are unwarranted by any facts based on a thorough knowledge of the bird's habits as known in this country. It is very convenient to join in the cry of enemy, thief, pest, and like epithets; but that is not a scientific method of reaching conclusions. We want a bill of particulars, more facts and less crusade against these 'assisted emigrants.'

They are charged with driving out other birds from our city. My home and place of observation being within twenty-five miles of New York City, I can speak from careful observation that this charge has but little value in this locality.

Very few birds care to dwell in cities, except in the suburbs. It is neither congenial to their taste nor adapted to their requirements, while the English sparrow is essentially a native of a city, finding comfortable shelter and abundant food wherever partially digested grain may be found, in stables or along the highways travelled by horses. Excepting in the spring and summer months, this waste material is the almost exclusive food of this bird. Now we will consider the country life of this sparrow.

They are charged with destroying our crops. Have the farmers of this country made this complaint, or must we echo the tirade from abroad? As a farmer, my observation is, that the amount of wheat this bird appropriates during the few days of harvesting is too insignificant for notice. I know of no other grain that is molested in the slightest degree. That they are large destroyers of insects during the summer months, every observer knows. The army-worm finds in the English sparrow one of its most vigilant enemies. As to the garden fruits, we find that it molests none, and kindly leaves all the cherries to the robins and cat-birds. I have many grape-vines trained against my buildings, with an abundance of sparrows roosting amid the clusters of grapes, and have wondered at the sparrow's poor judgment in not tasting a single bunch. Such is my observation of this bird: social in its habits, apparently of the most happy disposition, but at times pugnacious with his relatives, which encounters are never fatal in their consequences. Certainly it is no concern of ours; for they seem to possess, in a remarkable degree, the spirit of forgiveness, and live, on the whole, in great social harmony. We rightly know them as pest when they soil our piazzas and deface our window-casings. J. D. Hicks.

Old Westbury, N.Y.

Equality in ability of the young of the human species.

"We have a pernicious habit in this country of supposing, that . . . all men . . . are born equal as to their abilities." "We have a different theory in regard to horses."

"It would, perhaps, be a good plan, if the young of the human species were divided into two groups at an early age,— one large, and one small; one composed of those of whom nothing more than plain living is expected, and the other composed of the race-horses, of those whose ancestors, or whose chance endowments, give reason to hope that they may give some aid to learning or to culture. Any one whose destiny is to do difficult thinking in after-life should . . . dwell long among the geometrical concepts, should become thoroughly imbued with the bare and rigid form of reasoning, and should have the results as familiar as his mother-tongue."

A criticism of a recent book on geometry, in *Science supplement* of Jan. 1, gives occasion to the critic to give the above views of a topic much wider than that of geometry. He would differentiate the human species into two groups, — the race-horses and dray-horses,— and train them accordingly, and the basis of the differentiation would be 'ancestry,' or 'chance endowments.' Suppose this had been done in the past, what chance is there that Watt, Stephenson, or Ericsson would have become known as engineers; Franklin, Faraday, or Edison as electricians; Napoleon or Grant as soldiers; Lincoln or Garfield as statesmen; Livingston as an explorer; Carlyle as a writer? Is it not notorious that most great men have not been descended from distinguished ancestors, and that in most cases their chance endowments have not been discovered, either by themselves or by their friends, until the age of manhood? The habit in this country, of supposing all men born equal as to their abilities, has had ample justification in the past, and may have in the future. Among the poorest families in the farthest west there are many Grants, Lincolns, or Garfields; among tallow-chandlers' clerks there are Franklins; among Scottish farmers there are Carlyles: the poorest weavers may produce another Livingston; and some obscure Corsican may be another Napoleon. We of the American branch of the Anglo-Saxon race have all a good ancestry. Six generations back, each of us had thirty-two male ancestors, at least one of whom must have been distinguished as a king, a statesman, a general, a thinker, or possibly as a 'gentlemanly scoundrel,' or freebooter; and all American babies are born with some 'chance endowment,' which, if given the proper environment, will develop into ability. But, alas! the chances are that the growing child will not be given the proper environment. He may have the ancestral traits or the chance endowments which would lead him to be a great soldier, an artist, an engineer, or a farmer; and he will be sent to school, where all these traits or endowments will be repressed, and his education will tend to make him a storekeeper or a politician; or he may not be sent to school at all, and ancestral poverty may be the cause of his remaining a coal-miner or a 'farmer's hand' all his life, and Gray's 'Elegy' may be used as his epitaph.

Whether the young of the human species will develop into race-horses or dray-horses is not generally determinable by ancestry or by 'chance endowment,' but rather by environment during youth and early manhood. The youth has the ancestry of both dray-horse and race-horse combined, and the 'chance endowments' are numerous enough to include some of the qualities of both. Better assume that the young are born equal in ability, and in their early training, beginning with the kindergarten, give them an equal chance to develop into mechanics, storekeepers, artists, farmers, or lawyers, than to differentiate them into the classes of race-horses and dray-horses at the beginning. W. K.